Electronic Version
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Claims

[c1] 1.A multichannel, contactless power transfer system, comprising:
a primary power inverter disposed on a stationary side of the system;
an auxiliary power inverter disposed on said stationary side of the system;
a rotary transformer having a primary side thereof disposed on said stationary side of the system and a secondary side disposed on a rotating side of the system; and
said rotary transformer configured to couple primary power from an output of said primary power inverter to a primary power voltage output on said rotating side of the system, and said rotary transformer further configured to couple auxiliary power from an output of said auxiliary power inverter to at least one auxiliary voltage output on said rotating side of the system.

[c2] 2.The power transfer system of claim 1, wherein said primary and secondary sides of said rotary transformer further comprise concentric, E-shaped cores.

[c3] 3.The power transfer system of claim 2, wherein:

a first of said concentric, E-shaped cores of said primary side of said rotary transformer is wound with a winding coupled to the output of said primary power inverter; and

a second of said concentric, E-shaped cores of said primary side of said rotary transformer is wound with a winding coupled to the output of said auxiliary power inverter.

[c4] 4.The power transfer system of claim 3, wherein:

a first of said concentric, E-shaped cores of said secondary side of said rotary transformer is wound with a winding coupled to a tank circuit used to generate said primary power voltage output; and

a second of said concentric, E-shaped cores of said secondary side of said rotary transformer is wound with at least one winding used to generate said at least one auxiliary voltage output.

[c5] 5.The power transfer system of claim 4, wherein each winding in said primary and said secondary sides of said rotary transformer is arranged by configuring a wire within first and second channels of a corresponding E-shaped core, beginning at a first opening in said corresponding E-shaped core, traversing circumferentially around said first channel, traversing a second opening in said corresponding E-shaped core, and traversing cir-

cumferentially around said second channel in the opposite direction to about said first opening.

[c6] 6.The power transfer system of claim 1, wherein said primary power inverter further comprises a resonant network configured within a pair of output legs thereof.

[c7] 7.The power transfer system of claim 6, wherein said auxiliary power inverter further comprises a resonant network configured within a pair of output legs thereof.

[c8] 8.The power transfer system of claim 1, wherein a leakage inductance of said rotary transformer is used as part of a resonant network for said primary power inverter.

[c9] 9.The power transfer system of claim 8, further comprising a pair of resonant capacitors configured within said primary side of said rotary transformer, said resonant capacitors also comprising part of said resonant network for said primary power inverter.

[c10] 10.The power transfer system of claim 1, further comprising a power controller disposed on said stationary side, said power controller configured to receive digitized power output information from said primary power voltage output and said at least one auxiliary voltage output, transmitted through a contactless communications link, and wherein said power controller is further

configured to maintain a desired voltage level for said primary power voltage output and said at least one auxiliary voltage output.

[c11] 11.A multichannel, contactless power transfer system for a computed tomography (CT) system, comprising:
an x-ray power inverter disposed on a stationary side of the CT system;
an auxiliary power inverter disposed on said stationary side of the CT system;
a rotary transformer having a primary side thereof disposed on said stationary side of the CT system and a secondary side disposed on a rotating side of the CT system;
said rotary transformer configured to couple x-ray generation power from an output of said x-ray power inverter to a high-voltage tank circuit on said rotating side of the system, wherein said high-voltage tank circuit is further coupled to an x-ray generation tube; and
said rotary transformer further configured to couple auxiliary power from an output of said auxiliary power inverter to at least one auxiliary voltage output on said rotating side of the CT system.

[c12] 12.The power transfer system of claim 11, wherein said primary and secondary sides of said rotary transformer further comprise concentric, E-shaped cores.

[c13] 13.The power transfer system of claim 12, wherein:
a first of said concentric, E-shaped cores of said primary side of said rotary transformer is wound with a winding coupled to the output of said x-ray power inverter; and
a second of said concentric, E-shaped cores of said primary side of said rotary transformer is wound with a winding coupled to the output of said auxiliary power inverter.

[c14] 14.The power transfer system of claim 13, wherein:
a first of said concentric, E-shaped cores of said secondary side of said rotary transformer is wound with a winding coupled to said high-voltage tank circuit; and
a second of said concentric, E-shaped cores of said secondary side of said rotary transformer is wound with at least one winding used to generate said at least one auxiliary voltage output.

[c15] 15.The power transfer system of claim 14, wherein each winding in said primary and said secondary sides of said rotary transformer is arranged by configuring a wire within first and second channels of a corresponding E-shaped core, beginning at a first opening in said corresponding E-shaped core, traversing circumferentially around said first channel, traversing a second opening in said corresponding E-shaped core, and traversing cir-

cumferentially around said second channel in the opposite direction to about said first opening.

[c16] 16.The power transfer system of claim 11, wherein said x-ray power inverter further comprises a resonant network configured within a pair of output legs thereof.

[c17] 17.The power transfer system of claim 16, wherein said auxiliary power inverter further comprises a resonant network configured within a pair of output legs thereof.

[c18] 18.The power transfer system of claim 16, wherein said resonant network in said x-ray power inverter and said auxiliary power inverter further comprises a plurality of inductive and capacitive elements equally divided between said pair of output legs.

[c19] 19.The power transfer system of claim 11, wherein a leakage inductance of said rotary transformer is used as part of a resonant network for said primary power inverter.

[c20] 20.The power transfer system of claim 19, further comprising a pair of resonant capacitors configured within said primary side of said rotary transformer, said resonant capacitors also comprising part of said resonant network for said primary power inverter.

[c21] 21.The power transfer system of claim 11, further comprising a power controller disposed on said stationary side, said power controller configured to receive digitized power output information from said x-ray power voltage output and said at least one auxiliary voltage output, transmitted through a contactless communications link, and wherein said power controller is further configured to maintain a desired voltage level for said x-ray power voltage output and said at least one auxiliary voltage output.

[c22] 22.A multichannel rotary transformer, comprising:
a stationary side and a rotating side;
said stationary side comprising a pair of concentric, E-shaped cores wound with primary side windings;
said rotating side comprising a pair of concentric, E-shaped cores wound with secondary side windings;
wherein one of said pair of concentric, E-shaped cores is configured to couple primary power from said stationary side to said rotating side, and the other of said pair of concentric, E-shaped cores is further configured to couple auxiliary power from said stationary side to said rotating side.

[c23] 23.The multichannel rotary transformer of claim 22, wherein said rotating side further comprises a plurality of auxiliary voltage output windings.

[c24] 24.The multichannel rotary transformer of claim 23, wherein each winding in said stationary and said rotating sides of said rotary transformer is arranged by configuring a wire within first and second channels of a corresponding E-shaped core, beginning at a first opening in said corresponding E-shaped core, traversing circumferentially around said first channel, traversing a second opening in said corresponding E-shaped core, and traversing circumferentially around said second channel in the opposite direction to about said first opening.